

3. SURFACE WATER DATA

3.1 List of major databases for surface water quality data

1. U.S. Environmental Protection Agency
Database: Storage and Retrieval database (STORET) LDC and Modernized
2. U.S. Geological Survey
Database: National Water Information System (NWIS)
National Water Quality Assessment Program (NAWQA)
3. California Department of Water Resources
Database: Interagency Environmental Program (I.E.P) Dayflow
Water Data Library
California Data Exchange Center (CDEC)
4. U.S. Bureau of Reclamation
Database: DataWeb
5. California Data Exchange Environmental Network (CEDEN)
Database: Bay-Delta and Tributaries (BDAT)

3.2 Metadata Summary Table (Table 3-1, next page)

Table 3.1. Databases containing surface-water quality data for the California Central Valley

Database	Contact Person	Contact number	E-mail	Surface Water				Geographic Coverage	Temporal Coverage	Salinity data	Data Quality Comments
				Rivers/Streams/Sp rings	Lakes/ Reservoirs	Canals/ Aqueducts	Wetlands				
Environmental Protection Agency STORET (LDC)	Eric Wilson	(415) 972-3454	wilson.eric@epa.gov	X	X	X	X	Central Valley counties	1901-1999	conductance, alkalinity, stream flow, TDS, nutrients (e.g., phosphate, nitrate, nitrite) major inorganics (chloride, bicarbonate, carbonate, sulfate, calcium,sodium)	QA data must be obtained directly with the data provider.
Environmental Protection Agency STORET (Modernized)	Eric Wilson	(415) 972-3454	wilson.eric@epa.gov	X	X	X	X	Central Valley counties	1999-2008	conductance, alkalinity, stream flow, TDS, nutrients (e.g., phosphate, nitrate, nitrite) major inorganics (chloride, bicarbonate, carbonate, sulfate, calcium,sodium)	QA data must be obtained directly with the data provider.
U.S. Geological Survey NWIS	Michael V. Shulters	(916) 278-3000 1-888-275-5747		X	X			Central Valley counties	1899-2008	salinity, conductance, alkalinity, stream flow, nutrients (e.g., phosphate, nitrate, nitrite) major inorganics (chloride, bicarbonate, carbonate, sulfate, calcium,sodium)	Data retrieval contains collecting agency codes and comments on quality. For project specific reports must contact the district's office.
U.S. Geological Survey NAWQA	Sandy (Alex) K. Williamson (Database Team Leader) Nate Booth (Database developer)	(253)428-3600 x 2683	akwill@usgs.gov nlbooth@usgs.gov	X	X		X	51 U.S. Basins California Basins: Sacramento Basin, San Joaquin-Tulare Basin, Santa Ana Basin	1991-2001	salinity, conductance, alkalinity, stream flow, nutrients (e.g., phosphate, nitrate, nitrite) major inorganics (chloride, bicarbonate, carbonate, sulfate, calcium,sodium), and land use	QA/QC data follow those described by NWIS and also available as USGS publications
California Department of Water Resources I.E.P Dayflow	Anke Mueller-Solger (Staff Environmental Scientist)	(916) 651-9547	For dayflow data: centright@water.ca.gov	X		X		Bay-Delta Tributaries	flow data: 1956-2008, water quality data: 1964-2008	water flow, EC, and TDS	The database provides metadata and data errors and corrections
Department of Water Resources Water Data Library	Eric Senter Greg Smith Brian Niski	Eric Senter (916) 651-9648 Greg Smith (916) 653-6410 Brian Niski (916) 651-9289	esenter@water.ca.gov gregs@water.ca.gov bniski@water.ca.gov	X	X	X		Central Valley counties	1963-2008	Alkalinity, nitrate, nitrite, conductance sulfate, phosphate, TDS, and chloride	Analyses follow: EPA or Standards Methods Specifications, Lab QC data (1998-2007) available upon request.
Department of Water Resources California Data Exchange Center (CDEC)	Rodney Mayer (Acting Division Chief)	(916) 574-0601	webmaster@food.water.ca.gov	X	X	X		Hydrologic data recording stations within the Central Valley	1932-2008	EC, TDS, water flow	Data falling out of limits is flagged. Data is provisional and should not be considered data of record and is not an official source of historic climate data.
U.S. Bureau of Reclamation (DataWeb)	Michael Jackson (South Central California Area) Lynette Wirth (Mid-Pacific Region Projects)	(559)487-5116 (916)978-5100			X			Dams, reservoirs, and power plants within the Central Valley	Water quality 1964-2008 Water use data (1985-2000)	EC and TDS at USBR hydrologic data recording stations	USBR publishes data collected by standard and accepted methods or best available methods.
California Data Exchange Environmental Network (CEEN) (BDAT)	Karl Jacobs (BDAT Senior Project Manager)	(916) 651-9581	kljacobs@water.ca.gov	X	X	X		Bay-Delta Tributaries	1950-2008	Alkalinity, nitrate, nitrite, conductance, sulfate, phosphate, TDS, and chloride	Quality assurance data must be obtained directly with the data provider. Projects submitted to BDAT have metadata files.

3.3 Summary of Surface Water Coverage

Table 3.2 Department of Water Resources Water Data Library Water quality temporal coverage for the California Central Valley* Surface water and Ground water	
County	Temporal Coverage
Alameda	1989-2008
Alpine	No data**
Amador	No data**
Butte	1963-2008
Calaveras	No data**
Colusa	1998-2008
Contra Costa	1983-2008
El Dorado	No data**
Fresno	1998-2001
Glenn	1998-2008
Kern	1998-2008
Kings	1998-2008
Lake	1998-2008
Lassen	2000-2008
Madera	No data**
Mariposa	No data**
Merced	1988-2008
Modoc	2000-2008
Napa	No data**
Nevada	1998-2006
Placer	1998-2006
Plumas	1998-2007
Sacramento	1983-2008
San Benito	No data**
San Joaquin	1983-2008
Shasta	1998-2008
Sierra	1999-2007
Siskiyou	1999-2008
Solano	1983-2008
Stanislaus	1988-1999
Sutter	1963-2008
Tehama	1998-2008
Tulare	No data**
Tuolumne	No data**
Yolo	1991-2008
Yuba	1967-2007

*Earliest data recorded-1963

*Latest data recorded-2008

**No data-No data available for these counties

Table 3.3 Salinity data available for the Central Valley counties in the NAWQA database*								
Surface Water								
County	Specific conductance, conductivity	Alkalinity	Nitrate, Nitrogen, ammonia	Chloride	Sulfate	Phosphate	TDS	Salinity
Alameda								
Alpine								
Amador								
Butte	X	X	X	X	X	X		
Calaveras								
Colusa	X	X	X	X	X	X		
Contra Costa								
El Dorado								
Fresno	X							
Glenn	No data**							
Kern	X							
Kings	No data**							
Lake								
Lassen								
Madera	No data**							
Mariposa	X	X	X	X	X	X		
Merced	X	X	X	X	X	X		
Modoc								
Napa								
Nevada								
Placer	No data**							
Plumas								
Sacramento	X	X	X	X	X	X		
San Benito								
San Joaquin	X	X	X	X	X	X		
Shasta	X	X	X	X	X	X		
Sierra								
Siskiyou								
Solano	No data**							
Stanislaus	X	X	X	X	X	X		
Sutter	X	X	X	X	X	X		
Tehama	X	X	X	X	X	X		
Tulare	No data**							
Tuolumne								
Yolo	X	X	X	X	X	X		
Yuba	X	X	X	X	X	X		

*Total dissolved solids and salinity are listed as parameters in the database but no data is available for the Central Valley counties.

*Counties with missing data are not in the California basins studied by NAWQA

**No Data- no data available for the selected parameters in ground water and surface water; however, data for other parameters might have been recorded for the county

Table 3.4 Salinity data available for the Central Valley counties in the STORET Legacy database*								
Surface Water								
County	Specific conductance, conductivity	Alkalinity	Nitrate, Nitrogen, ammonia	Chloride	Sulfate	Phosphate	TDS	Salinity
Alameda	X	X	X	X	X	X		
Alpine	X	X	X	X	X	X	X	
Amador	X	X	X	X	X	X		
Butte	X	X	X	X	X	X		
Calaveras	X	X	X	X	X			
Colusa	X	X	X	X	X	X		
Contra Costa	X	X	X	X	X	X		
El Dorado	X	X	X	X	X		X	
Fresno	X	X	X	X	X	X		
Glenn	X	X	X	X	X	X		
Kern	X	X	X	X	X	X		
Kings	X	X	X	X	X	X		
Lake	X	X	X			X		
Lassen	X	X	X	X	X	X		
Madera	X	X	X	X	X	X		
Mariposa	X			X	X			
Merced	X	X	X					
Modoc	X	X	X		X			
Napa	X	X	X	X	X			
Nevada	X	X	X	X	X	X		
Placer	X	X	X	X	X	X	X	
Plumas	X	X	X	X	X	X		
Sacramento	X	X	X	X	X		X	
San Benito	X	X		X				
San Joaquin	X	X	X	X	X	X		X
Shasta	X	X	X	X	X	X		
Sierra	X	X	X	X	X			
Siskiyou	X	X	X	X	X		X	
Solano	X	X	X	X	X			
Stanislaus	X	X	X	X	X	X		
Sutter	X	X	X	X	X	X		
Tehama	X	X	X	X	X	X		
Tulare	X	X	X					
Tuolumne	X	X	X	X	X	X		
Yolo	X	X	X	X	X	X		
Yuba	X	X	X	X	X			

Table 3.5 Salinity data available for the Central Valley counties in the STORET Modernized database								
Surface Water								
County	Specific conductance, conductivity	Alkalinity	Nitrate, Nitrogen, ammonia	Chloride	Sulfate	Phosphate	TDS	Salinity
Alameda	X	X		X				X
Alpine	X	X	X	X				
Amador	No data*							
Butte	X			X				
Calaveras	X	X		X	X		X	
Colusa	X							
Contra Costa	X	X		X				X
El Dorado	X			X				
Fresno	X	X		X	X		X	
Glenn	X			X				
Kern	No data*							
Kings	No data*							
Lake	X			X				
Lassen	X	X		X				
Madera	X	X	X	X	X		X	
Mariposa	X			X				
Merced	X							X
Modoc	X			X				
Napa	X	X		X			X	X
Nevada	X	X		X	X		X	
Placer		X		X	X			
Plumas	X	X		X				
Sacramento	X			X				
San Benito	No data*							
San Joaquin	X			X				
Shasta	X	X	X	X				
Sierra	X			X				
Siskiyou	X	X		X				
Solano	X	X		X				X
Stanislaus	X							X
Sutter	X							
Tehama	X	X		X			X	
Tulare	X	X	X	X	X		X	
Tuolumne	X			X				
Yolo	X							
Yuba	X							

*No Data- no data available for the selected parameters; however, data for other parameters might have been recorded for the county

Table 3.6 USBR Central Valley Projects*

Project	Central Valley counties covered
Tracy pumping Plant	Alameda, Contra Costa, Fresno, Merced, Sacramento, and Stanislaus
Shasta Dam and Lake	Shasta and Tehama
East Park Dam	Colusa, Glenn, and Tehama
Folsom Dam	El Dorado, Placer, and Sacramento
Monticello Dam	Napa and Solano
Red Bluff Diversion Dam	Colusa, Glenn, and Tehama
New Melones Dam and Lake	Calaveras and Tuolumne
B.F. Sisk Dam and Reservoir	Fresno, Kings, and Merced
Friant Dam and Millerton Lake	Fresno, Kern, Madera, and Tulare
Delta-Mendota Canal (San Justo Dam and Reservoir)	San Benito
Sugar Pine Dam and Reservoir	El Dorado, Placer, Sacramento and San Joaquin

*Water quality data for the surface water systems are retrieved from hydrologic data recording station operated by the USBR. Although not all water quality data is available at the USBR DataWeb, links to other databases with water quality data are provided.

Table 3.7 Salinity Data available at I.E.P Dayflow Database					
Surface water					
Station	Owner (Agency)	EC	TDS	Time period EC*	Time period TDS**
Middle River at Borden Highway	DWR and USBR	X		01/01/1964 to 01/01/2003	
Lone Tree Way above Highway 4	USBR and CDEC	X		01/01/1964 to 01/31/2005	
Delta Mendota Canal at the headwork of the concrete liner	USBR	X	X	01/01/1964 to 05/31/2005	04/01/1996 to 28/28/1999
San Joaquin River at Jersey Point	USBR and DWR	X		01/01/1964 to 01/31/2008	
San Joaquin River at Vernallis	USBR and DWR	X	X	01/01/1964 to 01/31/2008	05/01/1996 to 12/31/1998
Contra Costa Canal at Pumping Plant 1	USBR and DWR	X		01/01/1964 to 01/31/2008	
Old River and Holland Cut at Little Mandeville Island	USBR CDEC	X		01/01/1964 to 05/31/2008	
Sacramento River at Greens Landing	USBR	X		01/01/1965 to 03/31/2004	
Sacramento River at Pittsburgh near light 31	USBR	X		01/01/1965 to 05/31/2005	
Sacramento River at Benicia Bridge	USBR	X		01/01/1966 to 12/31/1996	
Sacramento River at Rio Vista Bridge	DWR, USBR, and CDEC	X		01/01/1966 to 05/31/2005	
Sacramento River at Port Chicago	USBR and DWR	X		01/01/1966 to 01/31/2008	
Sacramento River at Collinsville	DWR and USBR	X		01/01/1966 to 01/31/2008	
Middle River near Old Mokelumne River (South Fork) at Staten Island	USBR	X		01/01/1968 to 12/31/1998	
Cache Slough near north end of Hastings	USBR	X		01/01/1969 to 05/31/2005	
San Joaquin River at Brandt Bridge	DWR	X		01/01/1972 to 05/31/2005	
San Joaquin River at Blind Point	DWR and CDEC	X		09/01/1982 to 12/31/1998	
San Joaquin River at Blind Point	DWR and CDEC	X		09/01/1982 to 09/30/1999	
Old River at Tracy Blvd	DWR	X		09/01/1982 to 01/31/2003	
Sacramento River S of Georgiana Slough	DWR	X		09/01/1982 to 08/31/2004	
Sacramento River near Mallard Island	DWR and CDEC	X		09/01/1982 to 01/31/2008	
Piper Slough at Bethel Tract	DWR	X		10/01/1982 to 9/30/1997	
East Contra Costa I.D. Pumping Plant at Indian Slough near Discovery Bay	DWR	X		10/01/1982 to 09/30/1997	
Steamboat Slough, below Sutter Slough	DWR	X		10/01/1982 to 02/28/1998	
Middle River at Middle River	DWR			10/01/1982 to 02/28/1998	
Mokelumne River (North Fork) below Snodgrass Slough, near Delta Cross Channel	DWR	X		10/01/1982 to 08/31/2004	
San Joaquin River at Antioch between lights 7 & 8	DWR and CDEC	X		05/01/1983 to 09/30/2002	
Stockton Ship Channel at Burns Cutoff	DWR and CDEC	X		05/01/1983 to 04/30/2004	
Piper Slough at Bethel Island	DWR and CDEC	X		12/01/1983 to 01/31/2008	

*Earliest EC data recorded: 1964

*Latest EC data data recorded: 2008

**TDS data recorded from 1996 to 1998

Table 3.7 (Cont.) Salinity Data available at I.E.P Dayflow Database Surface water					
Station	Owner (Agency)	EC	TDS	Time period EC*	Time period TDS**
Sacramento River at Martinez	DWR and CDEC	X		05/01/1983 to 05/01/2008	
San Joaquin River at Mossdale	DWR	X		01/01/1984 to 09/30/2002	
Rock Slough at Contra Costa Canal intake	DWR	X		10/01/1985 to 12/31/1998	
Montezuma Slough at Hunter Cut	DWR	X		12/01/1985 to 09/30/1998	
Frank Horan Slough at Teal Coub	DWR	X		12/01/1985 to 10/31/2001	
Hill Slough at Grizzly Rd.	DWR	X		12/01/1985 to 10/31/2001	
Roaring River at Montezuma Slough	DWR	X		12/01/1985 to 10/31/2001	
Montezuma Slough at Beldons	DWR and CDEC	X		12/01/1985 to 01/31/2008	
Suisun Slough at Volanti Slough	DWR and CDEC	X		12/01/1985 to 05/31/2008	
Roaring River at Sprig	DWR	X		01/01/1986 to 05/31/1998	
Montezuma Slough at National Steel	DWR	X		01/01/1986 to 10/31/2001	
Montezuma Slough at Roaring River	DWR	X		01/01/1986 to 10/31/2001	
Cordelia Slough at Cygnus	DWR	X		01/01/1986 to 10/31/2001	
Goodyear Slough at Fleet	DWR	X		01/01/1986 to 10/31/2001	
Goodyear Slough at Morrow Island	DWR and CDC	X		01/01/1986 to 02/29/2008	
Middle River at Tracy Blvd	DWR and CDEC	X		10/01/1987 to 12/31/2002	
Old River at Bacon Island	CDEC and DWR	X		02/01/1987 to 04/30/2004	
Chadbourne Slough at Sunrise Club	DWR and CDEC	X		03/01/1989 to 01/31/2008	
Grantline Canal at Tracy Blvd Bridge	DWR	X		10/01/1990 ro 01/31/2003	
Cordelia Slough at Ibis	DWR and CDEC	X		01/01/1991 to 03/31/2003	
Old River near Delta Mendota Canal (NW of barrier)	DWR	X		10/01/1992 to 01/31/2003	
Chadbourne Slough at Wells/Hollywood Club	DWR	X		04/01/1994 to 11/30/1995	
Cordelia Slough at Miramonte	DWR	X		08/01/1994 to 11/30/1995	
Cordelia Slough at Garibaldi	DWR	X		09/01/1994 to 10/31/1996	
Delta Mendota Canal at Check 20	USBR	X	X	04/01/1996 to 05/31/2005	04/01/1996 to 12/31/1998
Delta Mendota Canal at Check 21	USBR	X	X	04/01/1996 to 05/31/2005	04/01/1996 to 12/31/1998
Delta Mendota Canal Check 13	USBR	X		05/31/1996 to 05/31/2005	
Stanislaus River at Ripon	USBR	X	X	06/01/1996 to 05/31/2005	06/01/1996 to 12/31/1998
San Joaquin River before Prisoners Point	DWR and CDEC	X		04/01/1997 to 3/31/2006	
Clifton Court Forebay Radial Gates	DWR	X		01/01/1997 to 12/31/2008	
Sacramento River at Hood	DWR and CDEC	X		12/01/1998 to 10/31/2003	
San Joaquin River at the Channel Point Navy Bridge	DWR	X		07/01/2000 to 11/30/2000	
Delta Mendota Canal at Tracy Pumping Plant	DWR	X		04/01/2000 to 01/31/2008	

*Earliest EC data recorded: 1964

|*Latest EC data data recorded: 2008

**TDS data recorded from 1996 to 1998

3.4 Surface Water Coverage Notes

- Earliest surface-water quality data included in the NWIS database is from 1901.
- STORET LDC, NWIS, IEP, DWR, USBR, and BDAT have historic and modern data for download.
- NAWQA and STORET Modernized have modern data only (1990-2008).
- CDEC, IEP, and USBR share data. The real-time water quality data can be obtained from these databases retrieved from hydrologic-data recording stations. Some data queries sent to these databases have links to the other agencies' database.
- NAWQA and NWIS databases overlap. The difference is that NWIS has historic data for California and NAWQA has modern data for the California basins.

3.5 Metadata of Surface Water databases

3.5.1 NWIS (USGS)

U.S. Geological Survey NWIS Metadata Surface Water and Ground Water

Content Citation

Title of Content: National Water Information System
NWIS and NWISWeb
Type of Content: Downloadable data
Content Publisher: U.S. Geological Survey

Content Description

Content Summary: The USGS collects and analyzes chemical, physical, and biological properties of water, sediment and tissue samples from across the Nation. The NWIS is a system for storage and retrieval of water data for the nation.

The system is composed of four subsystems: the Ground-Water Site-Inventory System, the Water-Quality System, the Automated Data-Processing System, and the Water-Use Data System. Many types of data are stored in the NWIS data base, including Site information, Time-series (flow, stage, precipitation, chemical), peak flow, ground water, water quality, water use. The NWIS Web discrete sample data base is a compilation of over 4.4 million historical water quality analyses in the USGS district data bases through

September 2005. The discrete sample data is a large and complex set of data that has been collected by a variety of projects ranging from national programs to studies in small watersheds. Users should review the help notes and particularly the data retrieval precautions before beginning any retrieval or analysis of data from this data set. At selected surface-water and groundwater sites, the USGS maintains instruments that continuously record physical and chemical characteristics of the water including pH, specific conductance, temperature, dissolved oxygen, and percent dissolved-oxygen saturation. Supporting data such as air temperature and barometric pressure are also available at some sites.

Content Purpose: The USGS investigates the occurrence, quantity, quality, distribution, and movement of surface and underground waters and disseminates the data to the public, State and local governments, public and private utilities, and other Federal agencies involved with managing the water resources.

Time Period of Content

Date: 1899-2008

Content Status

Update Frequency: Data provided by NWISWeb are updated from NWIS on a regularly scheduled basis, and real-time data are generally updated upon receipt at local Water Science Centers. At sites where the information is transmitted automatically, data are available from the real-time data system. Once a complete day of readings are received from a site, daily summary data are generated and made available online. Annually, the USGS finalizes and publishes the daily data in a series of water-data reports.

Spatial Domain

State: States in the United States and territories

County: U.S. Counties

California: All California counties

California

Central Valley: All Central Valley counties

Spatial Data Information

Data Type: Many types of data are stored in NWIS, including comprehensive information for site characteristics, well-construction details, time-series data for gage height, stream flow, groundwater level, precipitation, and physical and chemical properties of water. Additionally, peak flows, chemical analyses for discrete samples of water, sediment, and biological media are accessible within NWIS.

Salinity Data:

Surface Water: Parameters measured: stream flow, conductivity, alkalinity, salinity dissolved salts, nutrients (nitrate,

phosphate, nitrite), major inorganics (sulfate, chloride, bicarbonate, carbonate, calcium, sodium)

Ground Water: conductivity, alkalinity, salinity dissolved salts, nutrients (nitrate, phosphate, nitrite), major inorganics (sulfate, chloride, bicarbonate, carbonate, calcium, sodium)

Data Format: NWISWeb provides several output options including: graphs of real-time stream flow, maps of real time sites water levels, and water quality; tabular output in HTML and ASCII tab-delimited files; and summary lists for selected sites that can be used as a basis for reselection to acquire refined details.

Access and Usage Information

Access: Online query at <http://waterdata.usgs.gov/nwis>

Query Structure: Query by data category of interest, by state, by county, by hydrologic unit or specific site, by latitude and longitude

Download requirements: file decompression software and spreadsheet creating programs

Data Owner and Data Quality

Owner: USGS

Quality: Quality Assurance/Quality Control (QA/QC) documentation available in NWIS:

- Field and laboratory protocols, and changes in those protocols, are documented in numerous reports and technical memoranda. These range from project-specific reports to national protocols. Current protocols are published in the USGS National Field Manual and other publications (<http://water.usgs.gov/owq/Fieldprocedures.html>).
- Summary of National QA/QC documentation through 1995. (Or see USGS Open-File Report 96-337).
- Technical memoranda, which document protocols.
- Information on national QC programs run by the Branch of Quality Systems.
- USGS Water Science Center offices may be contacted for project-specific QA/QC reports; and QC data.
- Sample information is defined by Fixed value codes
- Agency codes. The collecting agency code and analyzing agency (00028) are provided with each data retrieval.
- Sampling method information.
- Sampling method (82398)

- Sampler type (84164)
- Sample purpose code (71999) (samples collected for NAWQA and NASQAN, for example, are identified using this code. These National programs typically have nationally consistent protocols).
- Analytical method information
- Parameter code definition
- Method code

3.5.2 NAWQA (USGS)

U.S. Geological Survey NWIS Metadata Surface Water and Ground Water

Content Citation

Title of Content: National Water Information System
NWIS and NWISWeb

Type of Content: Downloadable data

Content Publisher: U.S. Geological Survey

Content Description

Content Summary: The USGS collects and analyzes chemical, physical, and biological properties of water, sediment and tissue samples from across the Nation. The NWIS is a system for storage and retrieval of water data for the nation.

The system is composed of four subsystems: the Ground-Water Site-Inventory System, the Water-Quality System, the Automated Data-Processing System, and the Water-Use Data System. Many types of data are stored in the NWIS data base, including Site information, Time-series (flow, stage, precipitation, chemical), peak flow, ground water, water quality, water use. The NWIS Web discrete sample data base is a compilation of over 4.4 million historical water quality analyses in the USGS district data bases through September 2005. The discrete sample data is a large and complex set of data that has been collected by a variety of projects ranging from national programs to studies in small watersheds. Users should review the help notes and particularly the data retrieval precautions before beginning any retrieval or analysis of data from this data set. At selected surface-water and groundwater sites, the USGS maintains instruments that continuously record physical and chemical characteristics of the water including pH, specific conductance, temperature, dissolved oxygen, and percent dissolved-oxygen saturation. Supporting data such as air temperature and barometric pressure are also available at some sites.

Content Purpose: The USGS investigates the occurrence, quantity, quality, distribution, and movement of surface and underground waters and disseminates

the data to the public, State and local governments, public and private utilities, and other Federal agencies involved with managing the water resources.

Time Period of Content

Date: 1899-2008

Content Status

Update Frequency: Data provided by NWISWeb are updated from NWIS on a regularly scheduled basis, and real-time data are generally updated upon receipt at local Water Science Centers. At sites where the information is transmitted automatically, data are available from the real-time data system. Once a complete day of readings are received from a site, daily summary data are generated and made available online. Annually, the USGS finalizes and publishes the daily data in a series of water-data reports.

Spatial Domain

State: States in the United States and territories

County: U.S. Counties

California: All California counties

California

Central Valley: All Central Valley counties

Spatial Data Information

Data Type: Many types of data are stored in NWIS, including comprehensive information for site characteristics, well-construction details, time-series data for gage height, stream flow, groundwater level, precipitation, and physical and chemical properties of water. Additionally, peak flows, chemical analyses for discrete samples of water, sediment, and biological media are accessible within NWIS.

Salinity Data:

Surface Water: Parameters measured: stream flow, conductivity, alkalinity, salinity dissolved salts, nutrients (nitrate, phosphate, nitrite), major inorganics (sulfate, chloride, bicarbonate, carbonate, calcium, sodium)

Ground Water: conductivity, alkalinity, salinity dissolved salts, nutrients (nitrate, phosphate, nitrite), major inorganics (sulfate, chloride, bicarbonate, carbonate, calcium, sodium)

Data Format: NWISWeb provides several output options including: graphs of real-time stream flow, maps of real time sites water levels, and water quality; tabular output in HTML and ASCII tab-delimited files; and summary lists for selected sites that can be used as a basis for reselection to acquire refined details.

Access and Usage Information

Access:	Online query at http://waterdata.usgs.gov/nwis
Query Structure:	Query by data category of interest, by state, by county, by hydrologic unit or specific site, by latitude and longitude
Download requirements:	file decompression software and spreadsheet creating programs

Data Owner and Data Quality

Owner:	USGS
Quality:	<p>Quality Assurance/Quality Control (QA/QC) documentation available in NWIS:</p> <ul style="list-style-type: none">• Field and laboratory protocols, and changes in those protocols, are documented in numerous reports and technical memoranda. These range from project-specific reports to national protocols. Current protocols are published in the USGS National Field Manual and other publications (http://water.usgs.gov/owq/Fieldprocedures.html).• Summary of National QA/QC documentation through 1995. (Or see USGS Open-File Report 96-337).• Technical memoranda, which document protocols.• Information on national QC programs run by the Branch of Quality Systems.• USGS Water Science Center offices may be contacted for project-specific QA/QC reports; and QC data.• Sample information is defined by Fixed value codes• Agency codes. The collecting agency code and analyzing agency (00028) are provided with each data retrieval.• Sampling method information.• Sampling method (82398)• Sampler type (84164)• Sample purpose code (71999) (samples collected for NAWQA and NASQAN, for example, are identified using this code. These National programs typically have nationally consistent protocols).• Analytical method information• Parameter code definition• Method code

3.5.3 STORET (US EPA)

U.S. Environmental Protection Agency STORET Metadata Surface Water and Ground Water

Content Citation

Title of Content: STORage and RETrieval database
STORET Legacy Data (LDC) and STORET Modernized
Type of Content: Downloadable data
Content Publisher: U.S. Environmental Protection Agency

Content Description

Content Summary: The LDC contains historical water quality data dating back to the early part of the 20th century and collected up to the end of 1998. STORET Modernized contains data collected beginning in 1999, along with older data that has been properly documented and migrated from the LDC. Both systems contain raw biological, chemical, and physical data on surface and ground water collected by federal, state and local agencies, Indian Tribes, volunteer groups, academics, and others. All 50 States, territories, and jurisdictions of the U.S. are represented in these systems.

Content Purpose: STORET (short for STORage and RETrieval) is a repository for water quality, biological, and physical data and is used by state environmental agencies, EPA and other federal agencies, universities, private citizens, and many others.

Time Period of Content

Date: 1901-2008

Content Status

Update Frequency: Modernized STORET is currently receiving new data on a regular basis, and will continue to do so for the foreseeable future. Downloads performed for the same sites may differ over time as a result of the addition of new data by their owners. LDC database does not permit updates.

Spatial Domain

State: All 50 States in the United States and U.S. Territories
County: U.S. Counties
California: All California counties
California Central Valley: All Central Valley Counties

Spatial Data Information

Data Type: Water quality data for rivers, streams, reservoirs, lakes, wells, canals and aqueducts. Data include physical water quality parameters (e.g., pH, temperature, conductivity, stage, storage, and stream flow), chemical water quality

parameters (e.g., nutrients, disinfection byproducts, pesticides, and isotopes), site identification, sampling methods, sample latitude and longitude as well as correspondent state, county and hydrologic unit code.

Salinity Data:

Surface water: Parameters measured: stream flow, conductivity, dissolved solids, nitrate, nitrogen, phosphate, sulfate, alkalinity, chloride, carbonate, sodium, calcium, and salinity. Salinity measurements are based on conductivity and in part per thousand. Total dissolved solids measurements are reported as sum of constituents, tons per day, electric conductivity and lb/day/cfs.

Ground water: Parameters measured: conductivity, dissolved solids, nitrate, nitrogen, phosphate, sulfate, alkalinity, chloride, carbonate, sodium and calcium, salinity. Salinity measurements are based on conductivity and in part per thousand. Total dissolved solids measurements are reported as sum of constituents, tons per day, electric conductivity and lb/day/cfs.

Data Format: .tar.gz, .txt, pdf, .jpeg, .gif, and html

Access and Usage Information

Access: Online query at www.epa.gov/storet/dbtop.html.

Query Structure: All STORET legacy data for each state can be downloaded via compressed self-extracting flat files delimited by <tabs>. Advance Query format for LDC and modern include data selection by state, by county, by hydrologic unit, station, sampling beginning date/ending date and water quality parameters

Download requirements: file decompression software and spreadsheet creating programs

Data Owner and Data Quality

Owner: Multiple agencies.
Note:
All data owned by STORET Agency "112WRD" (the United States Geological Survey) have been removed from the STORET Legacy Data Center (LDC). In the future, STORET will no longer maintain the "112WRD" USGS data on the STORET Legacy Data Center (LDC).

Quality: Quality assurance data must be obtained directly with the data provider. LDC database contains data of undocumented quality.

3.5.4 DWR database

California Department of Water Resources Water Data Library (WDL) Surface Water and Ground Water

Content Citation

Title of Content: Water Data Library (water quality data, groundwater data, surface-water data)
Type of Content: Downloadable data
Content Publisher: California Department of Water Resources

Content Description

Content Summary: DWR provides a central focal point for the collection and dissemination of water quality information for the Department and stakeholders through comprehensive water quality monitoring, analysis, and assessment; applied research; implementation of a rigorous quality assurance and control program; and, data management and dissemination. DWR collects water quality data throughout the state of California with a main focus on the Sacramento-San Joaquin Delta and the State Water Project. WDL provides on-line access to hydrologic data (water-quality data, groundwater level data, and surface-water data) collected by the Division of Planning and Local Assistance and other organizations inside and outside the Department.

Content Purpose: To document the environmental water quality conditions effected by operation of the SWP and the federal Central Valley Project through constituents throughout the Delta.

Time Period of Content

Date: 1963-2008

Content Status

Update Frequency:

Spatial Domain

State: California
County: All California counties
California
Central Valley: All Central Valley counties
Latitude and longitude not available for all sites

Spatial Data Information

Data Type: Water quality data for ground water and surface water

Salinity Data:

Surface water: Alkalinity, nitrate, nitrite, conductance, sulfate, phosphate, TDS, and chloride.

Ground water: Alkalinity, nitrate, nitrite, conductance, sulfate, phosphate, TDS, and chloride

Data Format: HTML, HTML Crosstab, MS excel, MS Crosstab, Text, Text Crosstab

Access and Usage Information

Access: Water-quality data at wdl.water.ca.gov

Query Structure: Search for stations using either partial or complete station name, and partial or complete station number, by selecting a county, or using a combination of any of the three options. For each county selection data can be retrieved by selecting date range and analytes. A limit of 15 stations can be selected for data retrieval in each county.

Note: not all counties listed have water quality data.

Download

requirements: spreadsheet creating programs

Data Owner and Data Quality

Owner: DWR

Quality: DWR follows established procedures for documenting the quality of the data. All analyses performed by DWR follow EPA or Standard methods specifications. DWR does not keep printed QA/QC documents but has QC data from 1998 onward available upon request. An analytical method code is provided with the data retrieval as a guide for users to determine whether results for a given analyte done by different methods are similar enough to be lumped together. In most cases they are, but in some cases, the data are incompatible because they represent different things. Examples include analytes such as Chloroform or Bromoform. Sometimes these are measured directly in the water, and sometimes they are created by the addition of chlorine and measured as a formation potential. The method comparability code will indicate whether the results can be used together. Other common differences may be found with nutrients and organic carbon.

2.5.5 USBR DataWeb

U.S. Bureau of Reclamation DataWeb Surface Water

Content Citation

Title of Content: DataWeb

Type of Content: Downloadable data

Content Publisher: U.S. Bureau of Reclamation

Content Description

Content Summary: DataWeb is an electronic presentation of the Bureau of Reclamation's (Reclamation) Project Data Book. Compilations of this kind of information have been published beginning in 1941 under the title *Summarized Data on Federal Reclamation Projects* and continued until 1982 as *Reclamation Project Data* (Supplemental). These publications have served the continuing need for historical, statistical, and technical information on the projects of the Bureau of Reclamation by legislators, State and Federal officials, water users, engineers, educators, students, and others, in foreign countries as well as the United States, who are concerned about water resource development.

Content Purpose: DataWeb attempts to continue to provide up-to-date USBR's project information on the Internet. Reclamation projects, substantially complete and in operation, are reviewed in detail with considerable attention to history, costs, beneficiaries, engineering, water data, and productivity.

Time Period of Content

Date: 1964-2008, Water use data (1985-2000),

Content Status

Update Frequency: USBR stations record data daily

Spatial Domain

State: Mid West and Western states of the United States

County:

California

Central Valley: Dams, reservoirs and power plants within the Central Valley region

Spatial Data Information

Data Type: Streamflow, annual discharge, outflow, irrigated area data, monthly and annual water deliveries, and diversions

Salinity Data: EC and TDS at USBR hydrologic data recording stations easily accessible at CDEC and IEP databases

Data Format: Real-time data, graphs, some data downloads as excel files

Access and Usage Information

Access: Data available at www.usbr.gov/dataweb

Query Structure: Query selection by project. Each project contains annual discharge information and links to USGS's NWIS database and DWR's CDEC database for streamflow data. Water quality data and water use data for the water bodies covered is accessible through links to the EPA surf your watershed database (<http://www.epa.gov/surf/>)

Download

requirements: spreadsheet creating programs

Data Owner and Data Quality

Owner: USBR
Quality: USBR publishes data collected by standard and accepted methods or best available methods.

3.5.6 DWR – IEP

California Department of Water Resources I.E.P. Metadata Surface water

Content Citation

Title of Content: Interagency Ecological Program (I.E.P.) **Dayflow, I.E.P HEC-DSS** Time-Series database
Type of Content: Downloadable data
Content Publisher: California Department of Water Resources

Content Description

Content Summary: The Dayflow program presently provides the best estimate of historical mean daily flows: (1) through the Delta Cross Channel and Georgiana Slough; (2) past Jersey Point; and (3) past Chipps Island to San Francisco Bay (net Delta outflow). The degree of accuracy of Dayflow output is affected by the Dayflow computational scheme and the accuracy and limitations of the input data. The input data include the principal Delta stream inflows, Delta precipitation, Delta exports, and Delta gross channel depletions. Both monitored and estimated values are included as described in this Dayflow program documentation. Currently, flows are not routed to account for travel time through the Delta. All calculations involving inflows, depletions, transfers, exports, and outflow are performed using data for the same day. All Dayflow summary reports distributed through January 1985, providing flow data through August 1984, and data for September 1984 reported herein were generated according to the algorithm described in the Computational Scheme section. The data storage system (DSS), which is suitable for time-series data, was developed by the Hydrologic Engineering Center (HEC) of the US Army Corps of Engineers contains the Hydrodynamics & water quality data of the California Bay-Delta Tributary collected by different agencies at over 120 stations (mostly fixed-position stations).

Content Purpose: To provide for the collection and analysis of data needed to understand factors in the Sacramento-San Joaquin estuary controlling the distribution and abundance of selected fish and wildlife resources and make the data readily available to other agencies and the public. To comply with permit terms requiring ecological monitoring in the estuary. To identify impacts of human activities on the fish and wildlife resources. To interpret information produced by the program and from other sources and, to the extent possible, recommend measures to avoid and/or offset adverse impacts of water project operation and other human activities on these resources. To seek consensus for such recommendations, but to report differing recommendations when consensus is not achieved. To provide an organizational structure and program resources to assist in planning, coordination, and integration of estuarine studies by other units of cooperating agencies or by other agencies.

Time Period of Content

Date: 1956 to 2008

Content Status

Update Frequency: Data is obtained daily

Spatial Domain

State: California

County: Counties with the Bay-Delta Tributaries

California

Central Valley: Hydrologic data recording stations within the Sacramento area and northern San Joaquin Basin

Spatial Data Information

Data Type: Water exports to the Bay Delta. Delta inflow and outflow data was calculated from flow estimates from the Sacramento River, San Joaquin River, Yolo Bypass, Marsh Creek, Morrison Creek, Stockton diverting canal, Bear Creek, Dry Creek South Fork Putah creek, state water project exports, water diversions, and the Delta Cross Channel and Georgina Slough.

Salinity Data: Historic and modern EC and TDS data at some stations within the Bay-Delta tributaries. Conductance, flow measurements in cfs, input data parameters are the principal streamflows to the Delta, Delta precipitation, exports and diversions from the Delta, and Delta consumptive use (gross channel depletions).

Data Format: The hydrodynamics and water quality database can be downloaded as .dss format, 3D graphs, Delta Simulation Modeling 2 (DSM2)

Access and Usage Information

Access: Online query at <http://iep.water.ca.gov/dss/all>. Water quality from the DWR Environmental Monitoring Program, available at <http://bdat.ca.gov>. Dayflow output no longer includes Water Year Classification. Water Year Classification data are available at <http://cdec.water.ca.gov/cgi-progs/iodir/wsihist>.

Query Structure: Daily flow data from the Bay-Delta tributaries can be acquired by the water year
Measurements for surface water (i.e., EC, Temp, DO) can be obtained for each measuring stations in the delta area.

Download requirements: VISTA: Visualization Tool and Analyzer
Dayflow Program Execution
To run the program, execute the batch file "rundayflow.bat". This batch file runs the Dayflow.java program which is contained in Dayflow.jar.

- Click on the buttons labeled "click to specify" to define the water year and the input file name.
- Enter the water year classification in the text field.
- The output file will be created in the directory in which you run the program. The output filename will be dayflowCalculationsXXXX.out.

Data Owner and Data Quality

Owner:

Multiple agencies:

U.S. Geological Survey (USGS), Department of Water Resources (DWR), U.S. Bureau of Reclamation (USBR), U.S. Environmental Protection Agency (EPA), National Marine Fisheries Service (NMFS), Department of Fish and Game (DFG), State Water Resources Control Board (SWRCB), U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers (USACE)

Quality:

The degree of accuracy of Dayflow output is affected by the Dayflow computational scheme and the accuracy and limitations of the input data. Data prior to 1978 were hand calculated. For water years prior to 1982-83, revisions were made in February 1985. The changes for water years prior to 1983-84 are documented in Attachment C and reported in Attachment G. Some essential information must be known for proper interpretation of Dayflow data reported to the water year 1983-84.

- All input data acquired for water year 1983-84 is preliminary and subject to revision following final screening by the respective sources.
- The Dayflow program was run for water year 1983-84 only through August, because data for Mokelumne River were not available at time of execution. Also, the program was run without data for Marsh Creek (not monitored) and Dry Creek (not available).
- Certain input parameter records were missing data for various days. The specific parameters, the dates for which data are missing, and the estimated or assumed values substituted are presented in Table 4 of the Dayflow Output Addendum (January 1985). The Dayflow program was executed for water year 1983-84 with these substituted values.

Changes in gear or procedures which affected the data over time:

In January 1995, modifications were made to the calculations used to generate some of the Dayflow parameters. Using these new formulas, historic and current Dayflow values were recalculated. All Dayflow data presented on the IEP file server utilize the new formulations.

3.5.7 CEDEN

California Data Exchange Environmental Network (CEDEN) Metadata Surface Water

Content Citation

Title of Content: Bay Delta and Tributaries Project (BDAT)
Type of Content: Downloadable data
Content Publisher: California Data Exchange Environmental Network (CEDEN)

Content Description

Content Summary: BDAT contains environmental data concerning the San Francisco Bay-Delta and provides public access to that data. Over fifty organizations contribute data voluntarily to this project. The database includes biological, water quality, and meteorological data. These can be used to gauge the health of the estuary and to manage water and environmental resources.

Content Purpose: The purpose of this network is to allow the exchange of water and environmental data between groups and to provide access to the public.

Time Period of Content

Date: 1950-2008

Content Status

Update Frequency: Customized reports on data update are under development.

Spatial Domain

State: California
County:
California: Bay Delta Tributaries
California
Central Valley: Northern Central Valley counties comprising the Bay-Delta tributaries

Spatial Data Information

Data Type:
Salinity Data: Alkalinity, conductivity, TDS, salinity, chloride, nitrate, sulfate, phosphate
Data Format: HTML, excel, zipped text file,

Access and Usage Information

Access: Online at <http://bdat.ca.gov>

Query Structure: Query data by category of interest, analytes, data range, projects, stations, and methods.

Download requirements: Excel

Data Owner and Data Quality

Owner: Bay-Delta Science Consortium (BDSC), Central Valley Project Improvement Act/Comprehensive Assessment and Monitoring Program CVPIA/CAMP, CALFED-BAY DELTA, CALFED-Ecosystem Restoration Program (ERP), CALFED-Drinking Water, Department of Water Resources, Division of Environmental Services (DWR-DES), Department of Water Resources, Operations and Maintenance (DWR-O&M), Department of Water Resources, Bay Delta Office (DWR-BDO), U. S. Environmental Protection Agency (EPA), Interagency Ecological Program (IEP), and Surface Water Ambient Monitoring Program (SWAMP)

Quality: Historical data does not contain QC data. Recent data is as accurate as is received from the providers. The providers are responsible for checking the quality of the data before it is sent to BDAT. Quality assurance data must be obtained directly with the data provider. Projects submitted to BDAT have metadata files.

3.5.8 BDAT

**California Department of Water Resources California Data Exchange Center
Surface water**

Content Citation

Title of Content: California Data Exchange Center
Type of Content: Downloadable data
Content Publisher: California Department of Water Resources

Content Description

Content Summary: The California Data Exchange Center (CDEC) collects, stores, disseminates, and exchanges hydrometeorological data and related information. The data collection began as a small system designed to obtain data urgently needed to provide river stage forecasts and flood warnings for the North Coastal area and for the Central Valley. In the beginning, data was obtained from less than 100 telemetered precipitation and stream gage stations. Since then, real-time hydrometeorological data needs have continuously grown. Currently, numerous Federal, State, and local agencies collect data from hundreds of rain, snow, temperature, wind, atmospheric pressure, humidity, and stream stage sensors. The data enable forecasters to prepare flood forecasts and water supply forecasts; reservoir and hydroelectric operators to schedule reservoir releases; and water suppliers to anticipate water availability.

Content Purpose: CDEC provides a centralized location to store and process real-time hydrologic information gathered by various cooperators throughout the State. CDEC then disseminates this information to the cooperators, public and private agencies, and news media

Time Period of Content

Date: 1932-2008

Content Status

Update Frequency: Data is recorded hourly and daily

Spatial Domain

State: California

County: All California counties

California

Central Valley: Hydrologic data recording stations within the Central Valley streams canals, reservoirs, and lakes

Spatial Data Information

Data Type: Real-time data, Daily data, Monthly data, and Historical data for outflow, inflow, stage, and storage for rivers and reservoirs.

Salinity Data: Outflow and inflow data in cfs, electrical conductance, total dissolved solids

Data Format: Data can be downloaded as HTML, plots, and maps. For more than 800 data points data should be obtained as comma-separated-value (CSV) or SHEF (Standard Hydrologic Exchange Format) or in web format.

Access and Usage Information

Access: Data available at cdec.water.ca.gov

Query Structure: Query by Station ID, desired data (Daily, monthly, hourly) and listed parameter of interest.

Download requirements: spreadsheet creating programs

Data Owner and Data Quality

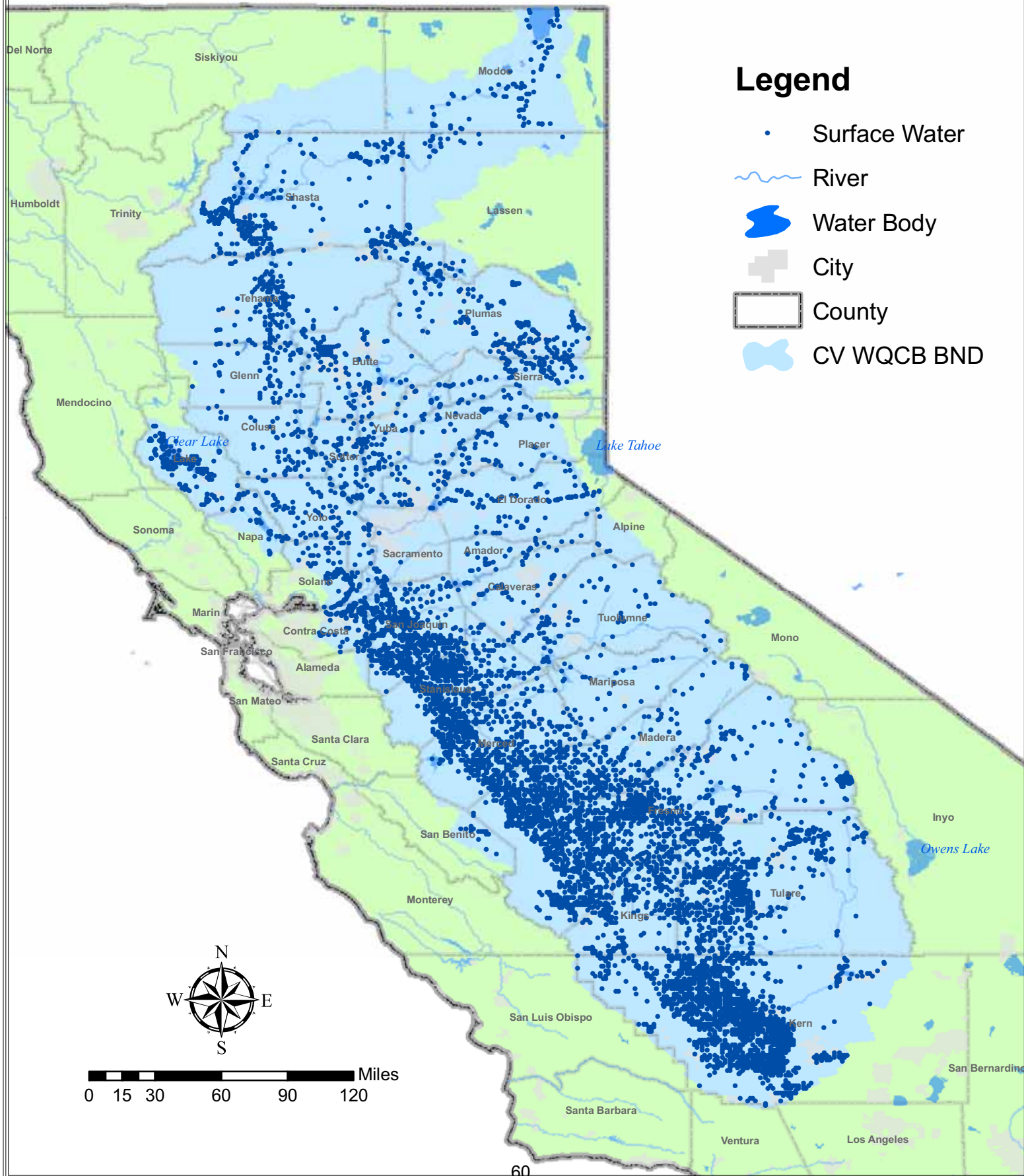
Owner: Department of Water Resources (DWR), National Weather Service (NWS), U.S. Bureau of Reclamation (USBR), U.S. Army Corps of Engineers (USACE), Pacific Gas & Electric (PG&E), Sacramento Municipal District (SMUD), and U.S. Geological Survey (USGS).

Quality: Real-time data is preliminary and subject to revision. Data limits are checked post-process, though there are some checks done at the instrumentation level. Data falling out of limits is flagged. The flagging varies depending on the type

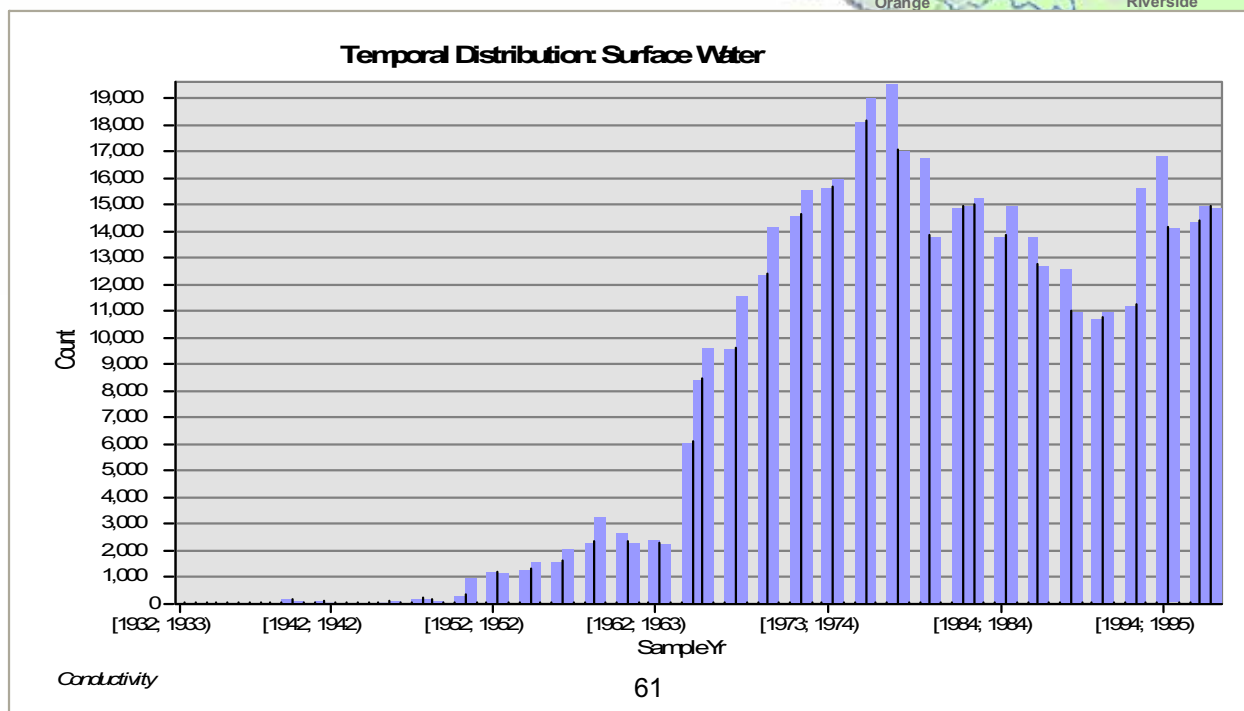
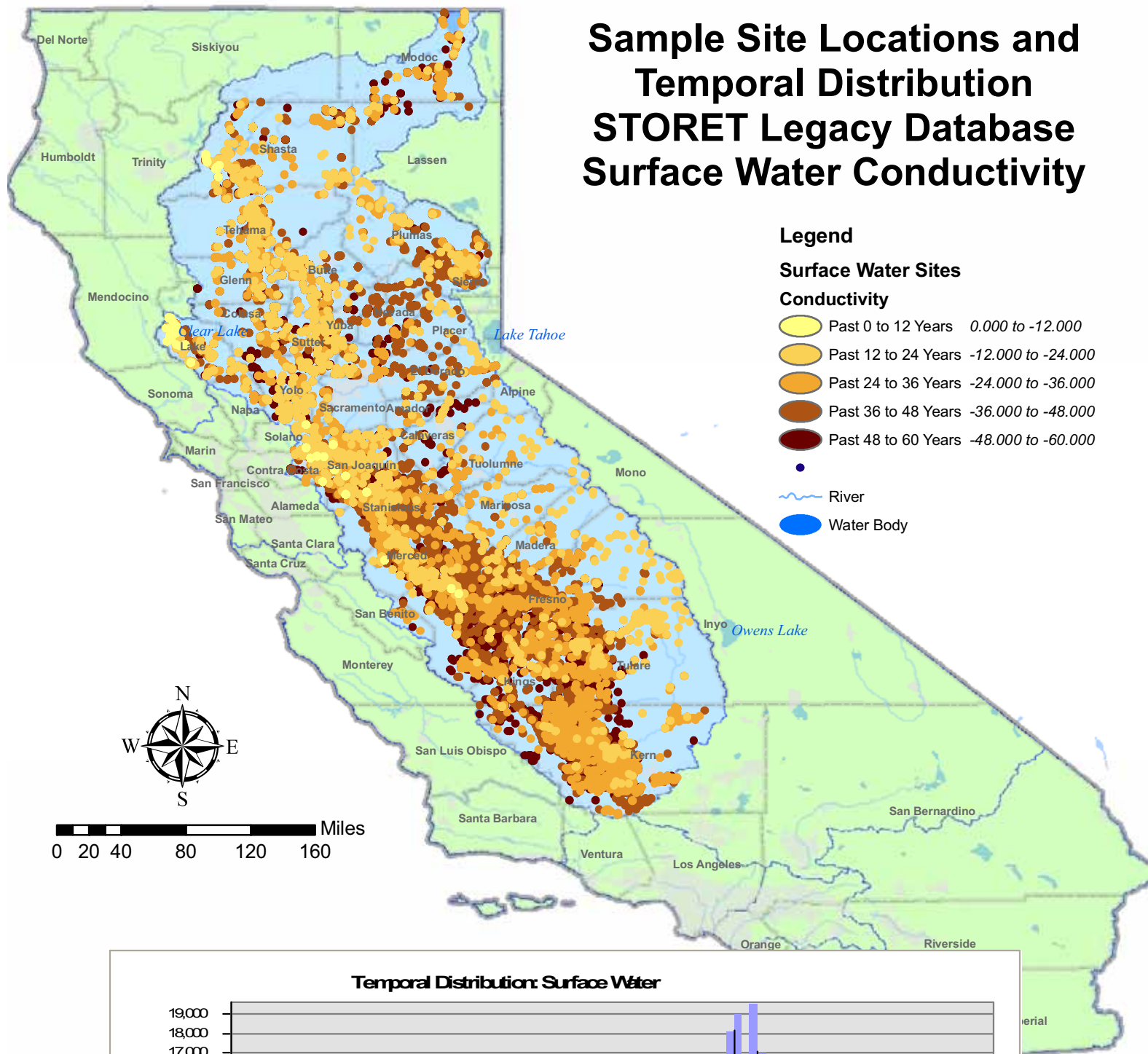
of data. Much of the data is real-time and has not been reviewed, and it should be checked against nearby stations. The data is preliminary and is used to primarily monitor current weather and hydrologic conditions as it relates to river forecasting and water supply. Since CDEC is a real-time operation, the data is provisional and should not be considered data of record and is not an official source of historic climate data.

Surface Water Sample Site Locations

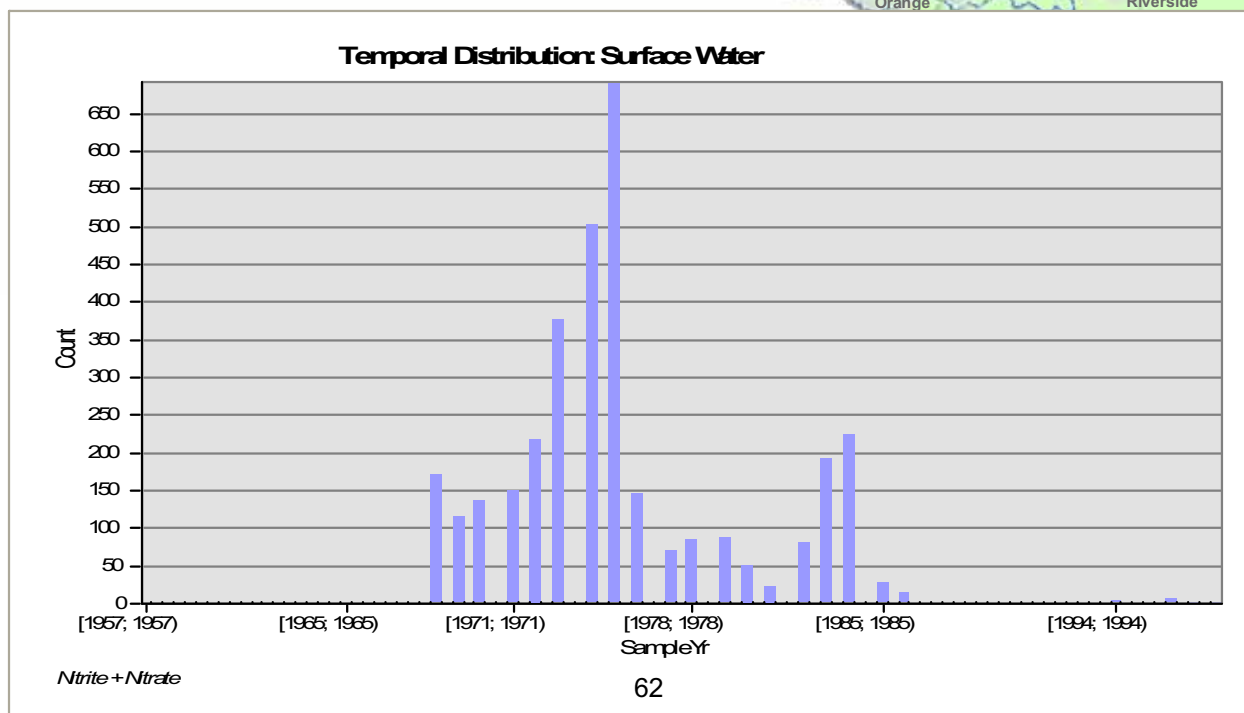
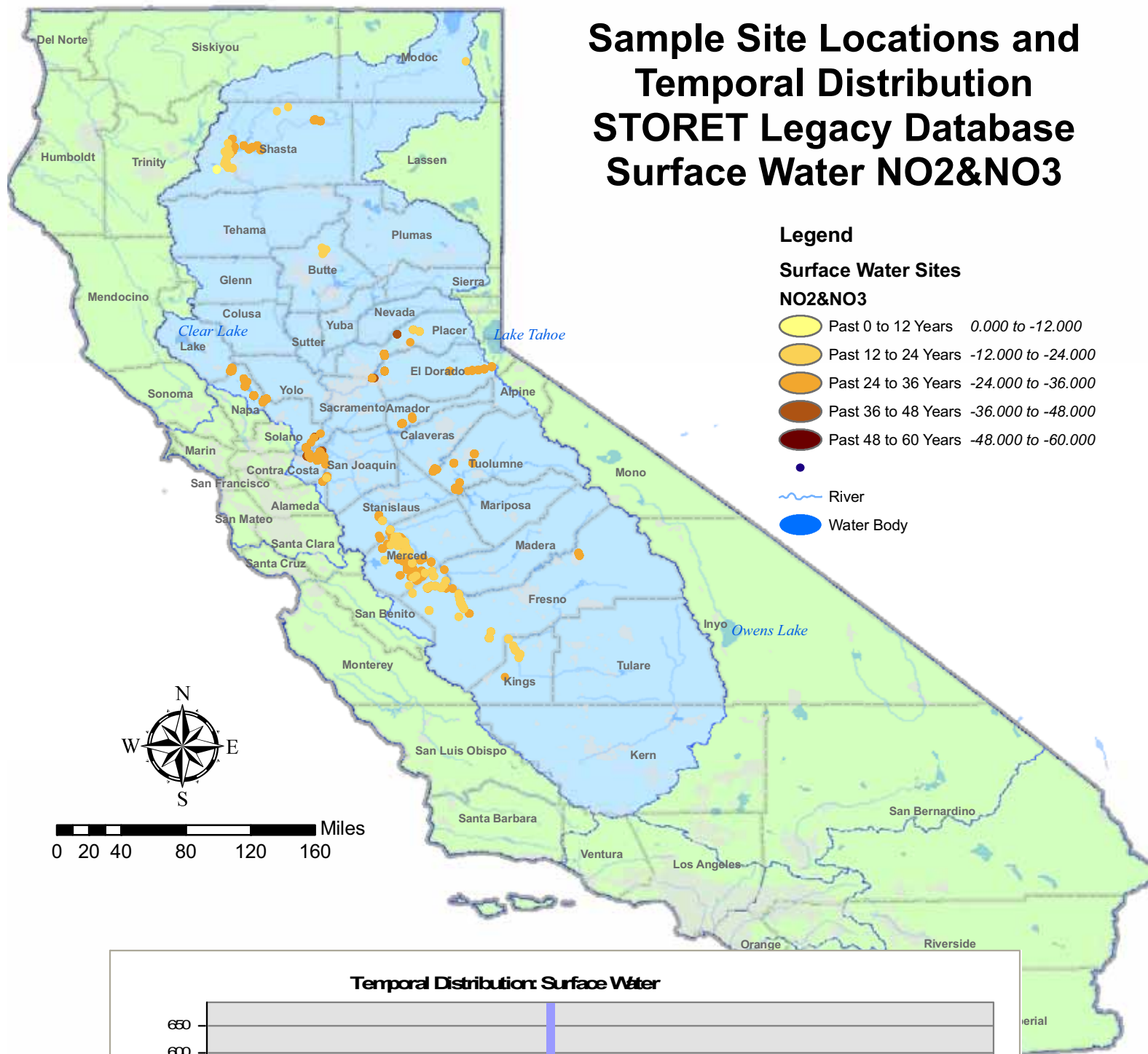
STORET Legacy Database



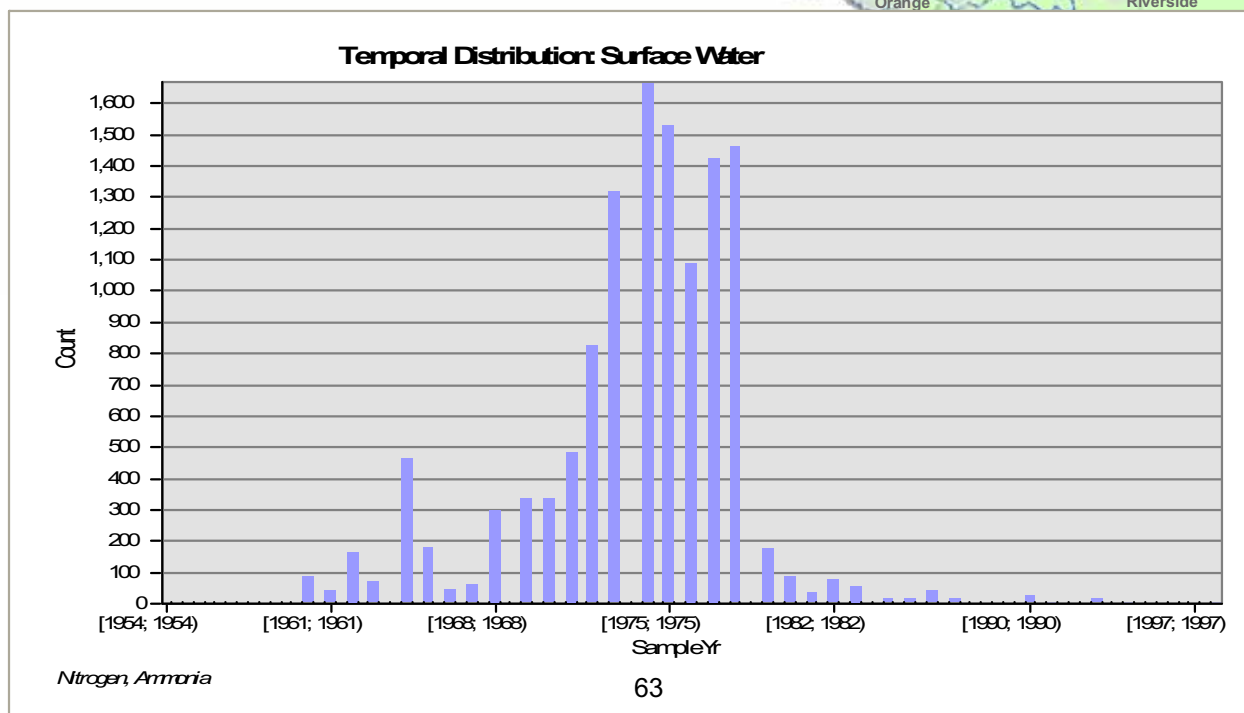
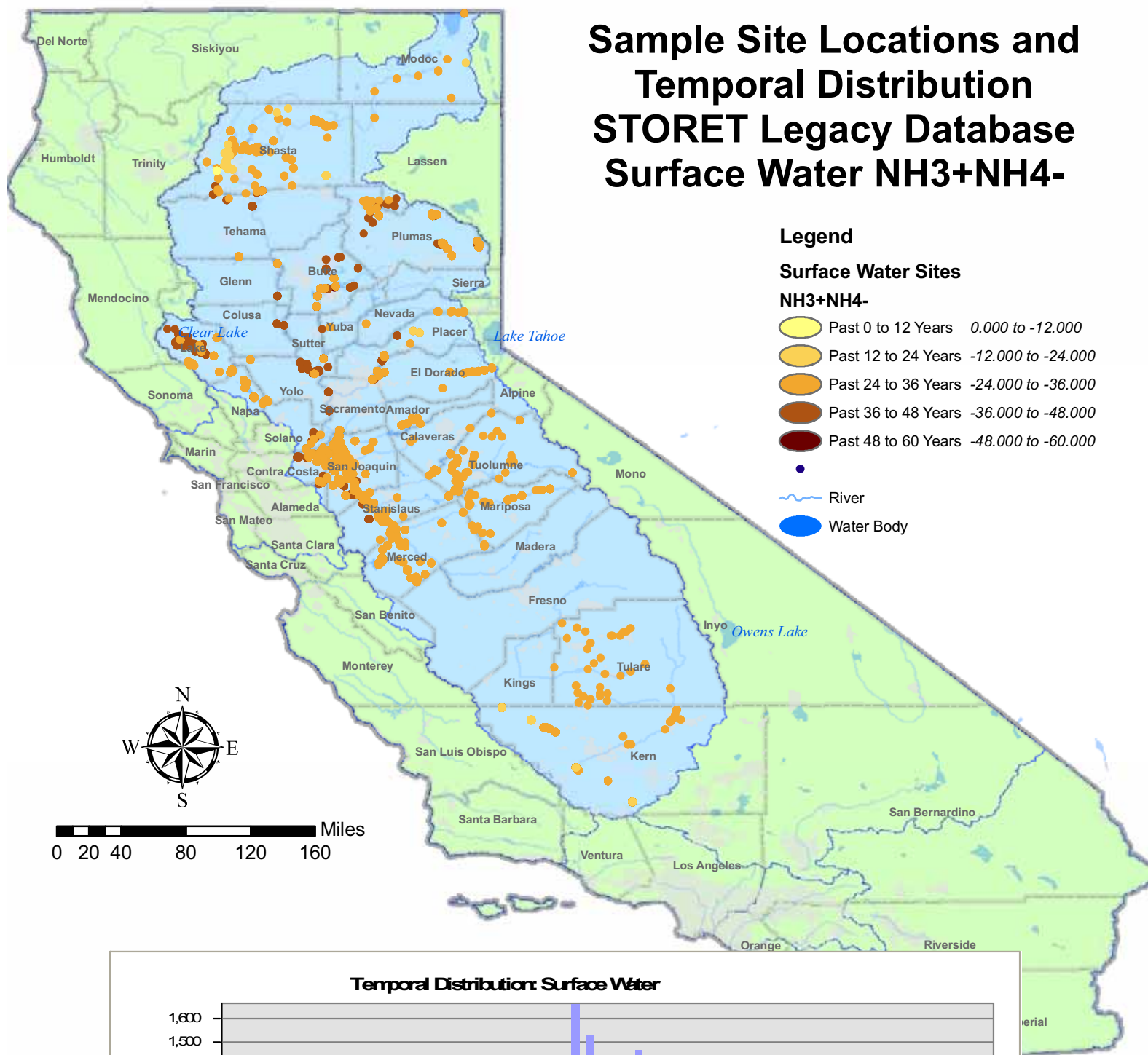
Sample Site Locations and Temporal Distribution STORET Legacy Database Surface Water Conductivity



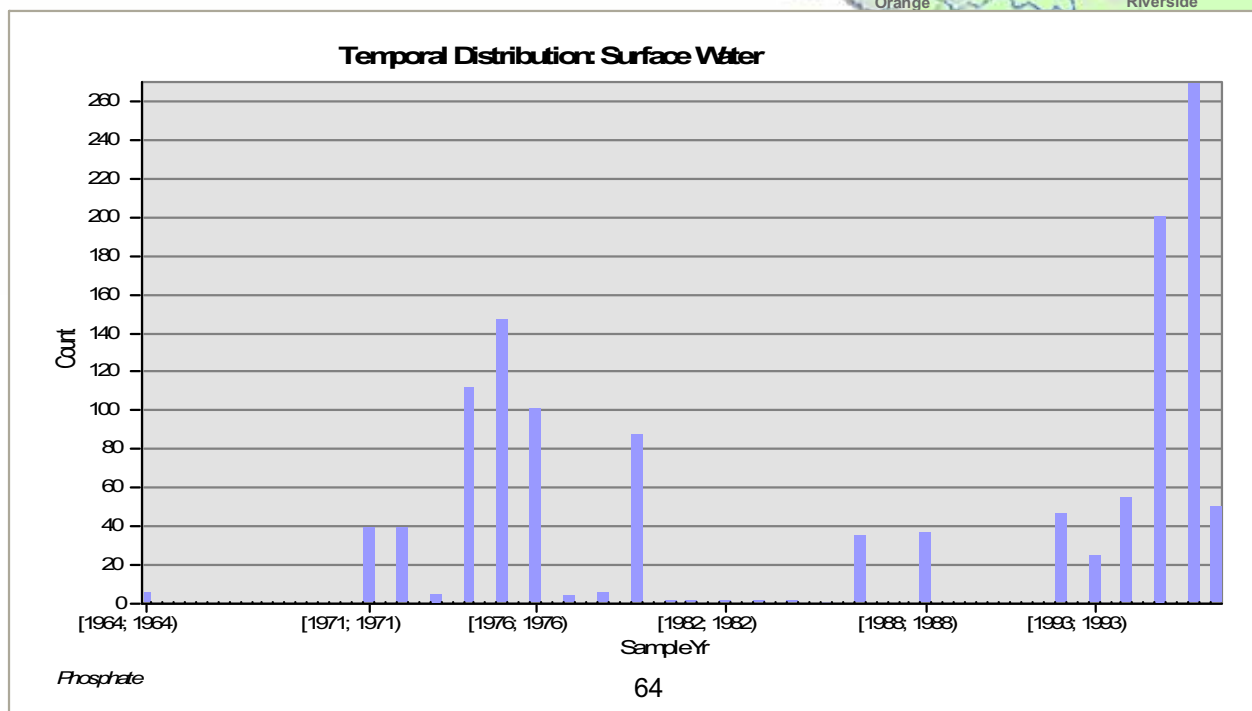
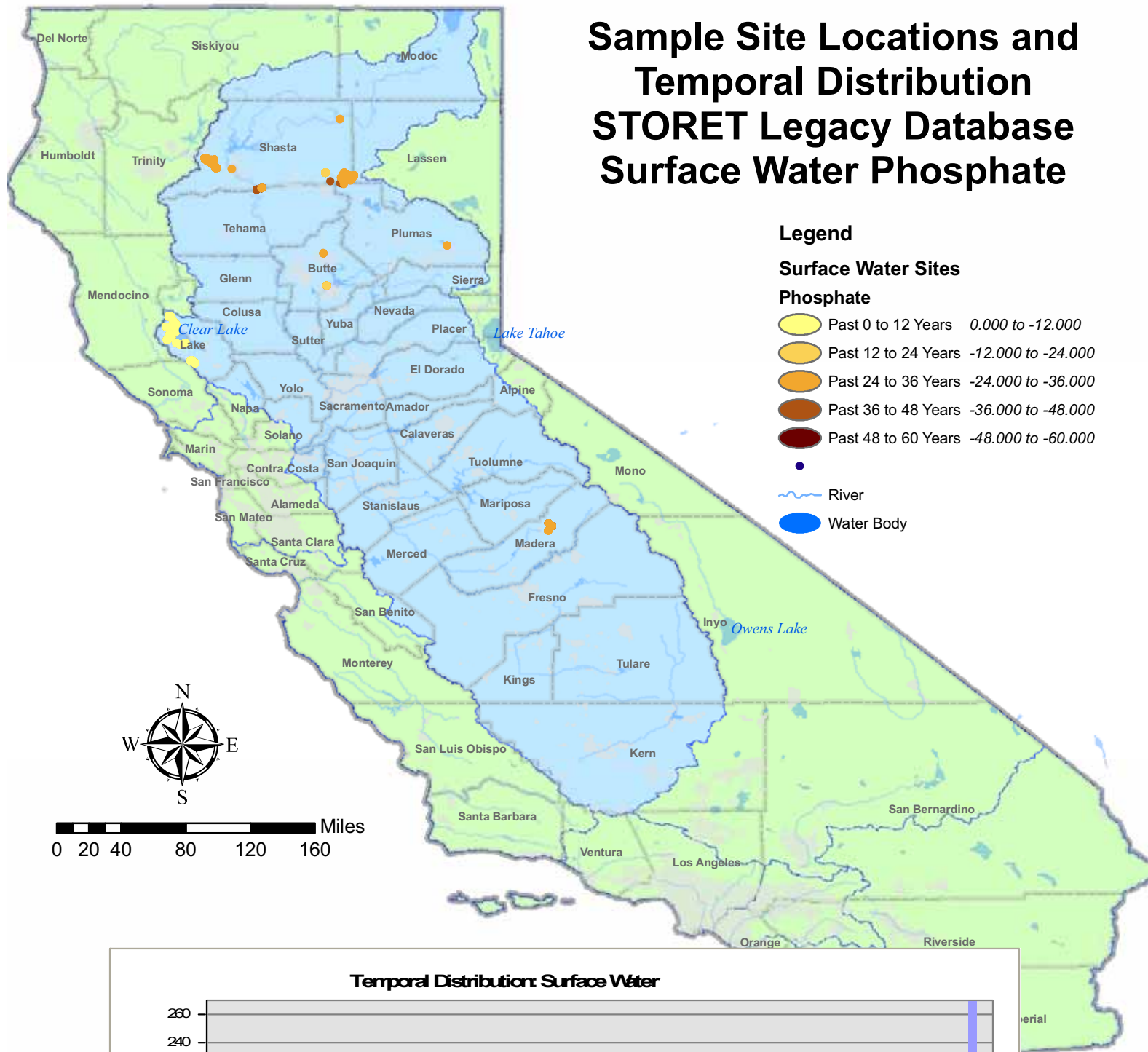
Sample Site Locations and Temporal Distribution STORET Legacy Database Surface Water NO₂&NO₃



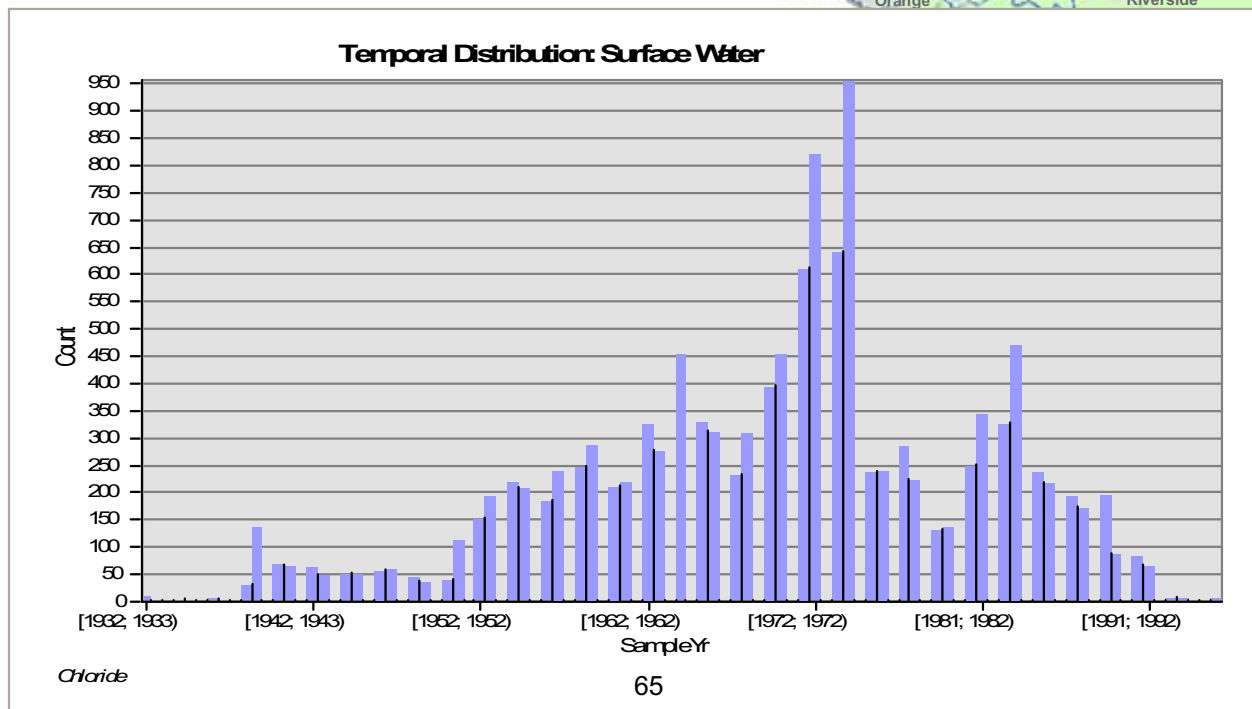
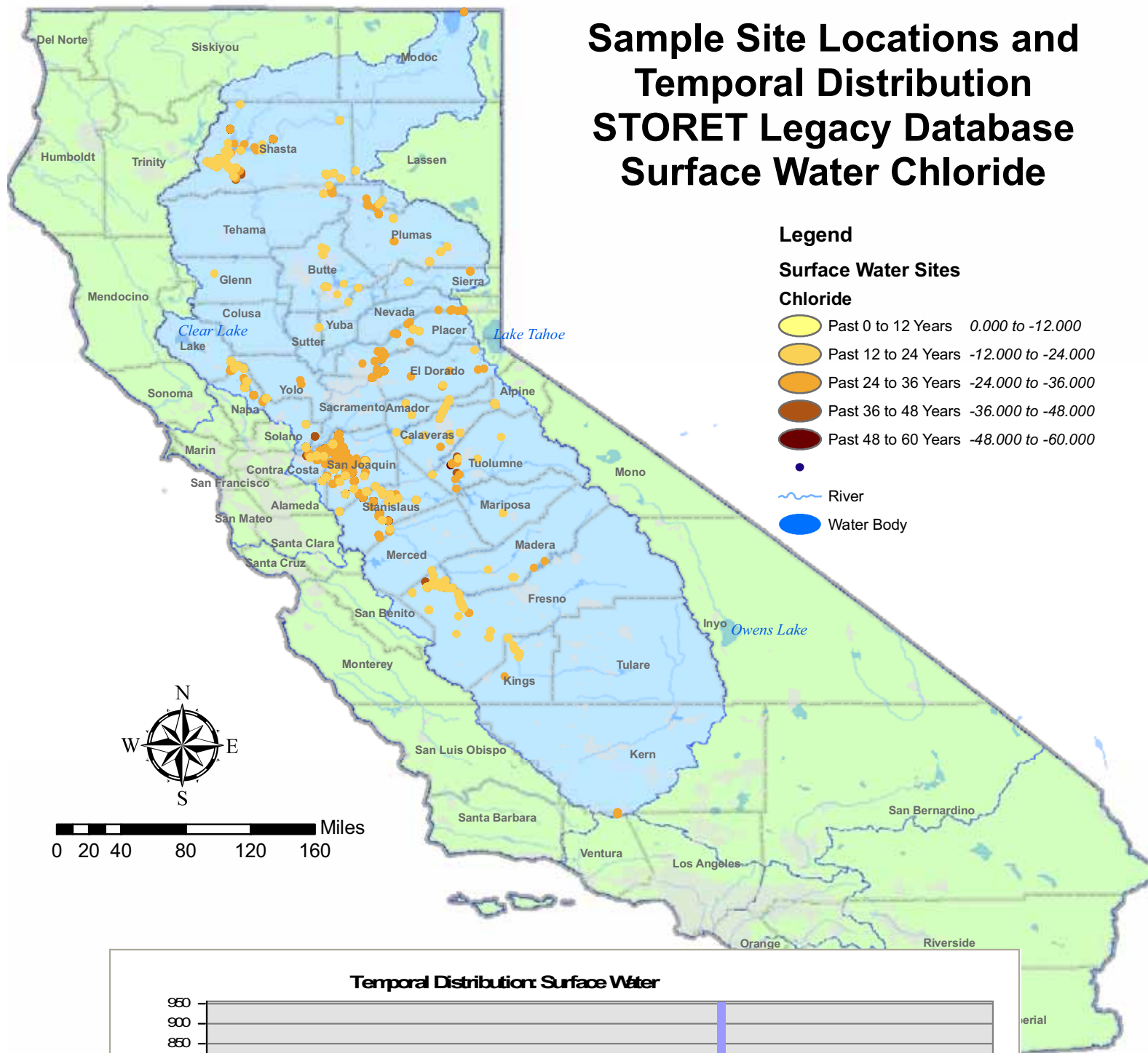
Sample Site Locations and Temporal Distribution STORET Legacy Database Surface Water NH₃+NH₄-



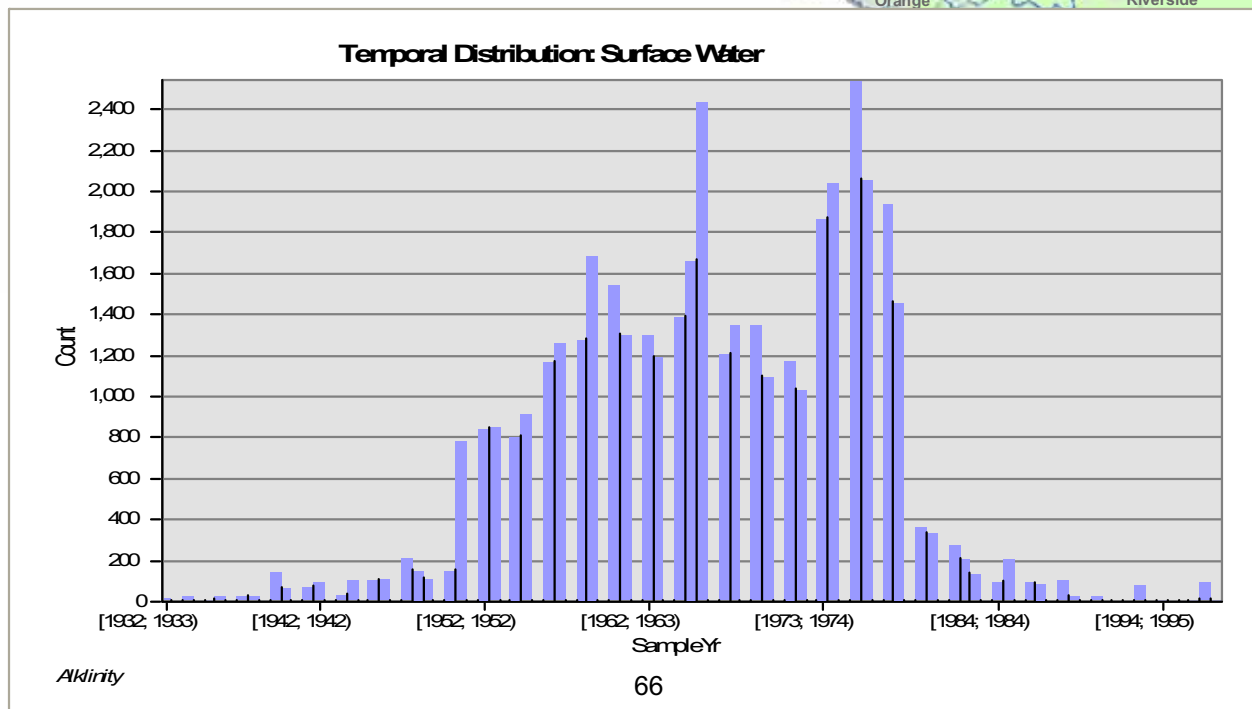
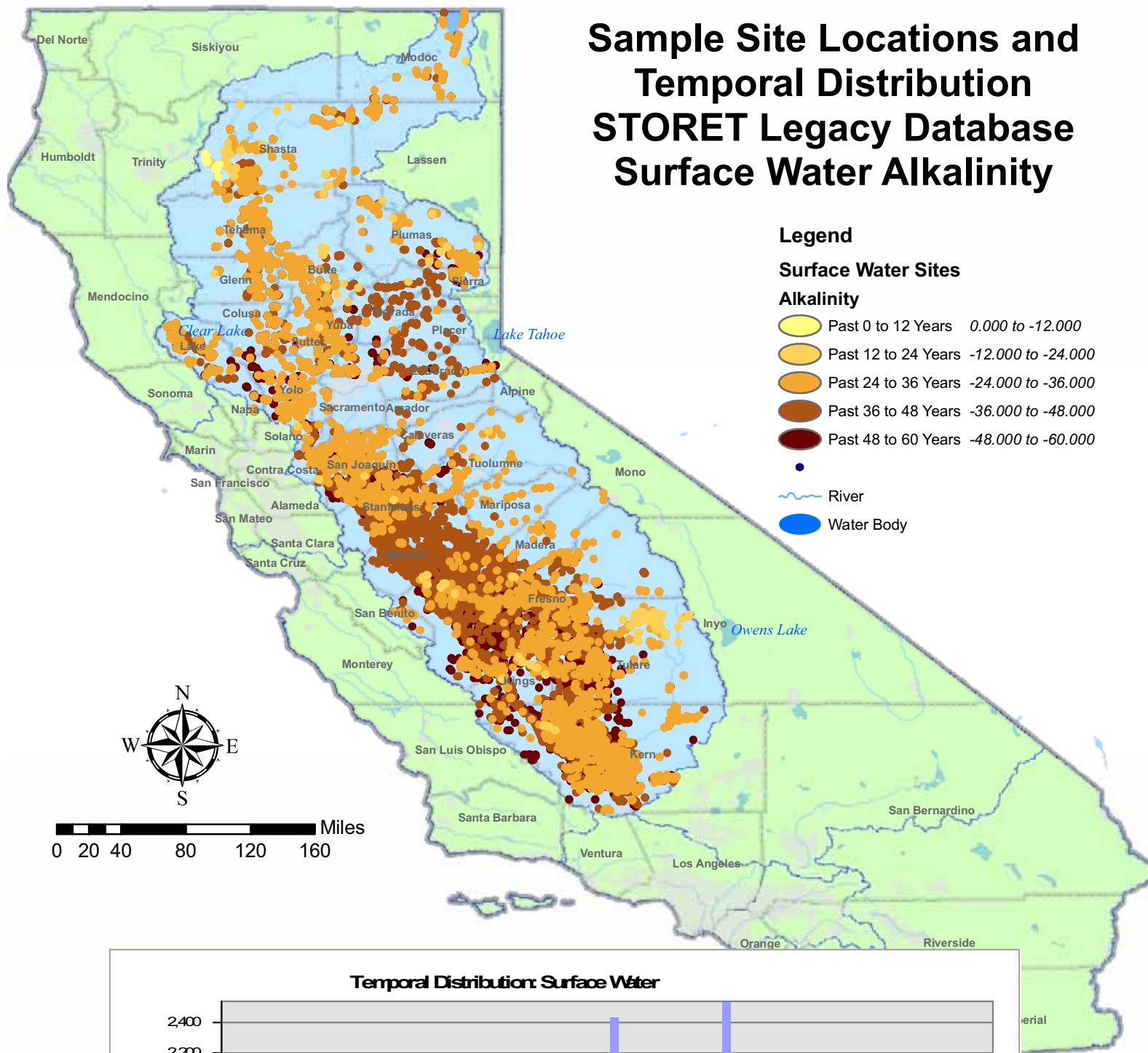
Sample Site Locations and Temporal Distribution STORET Legacy Database Surface Water Phosphate



Sample Site Locations and Temporal Distribution STORET Legacy Database Surface Water Chloride



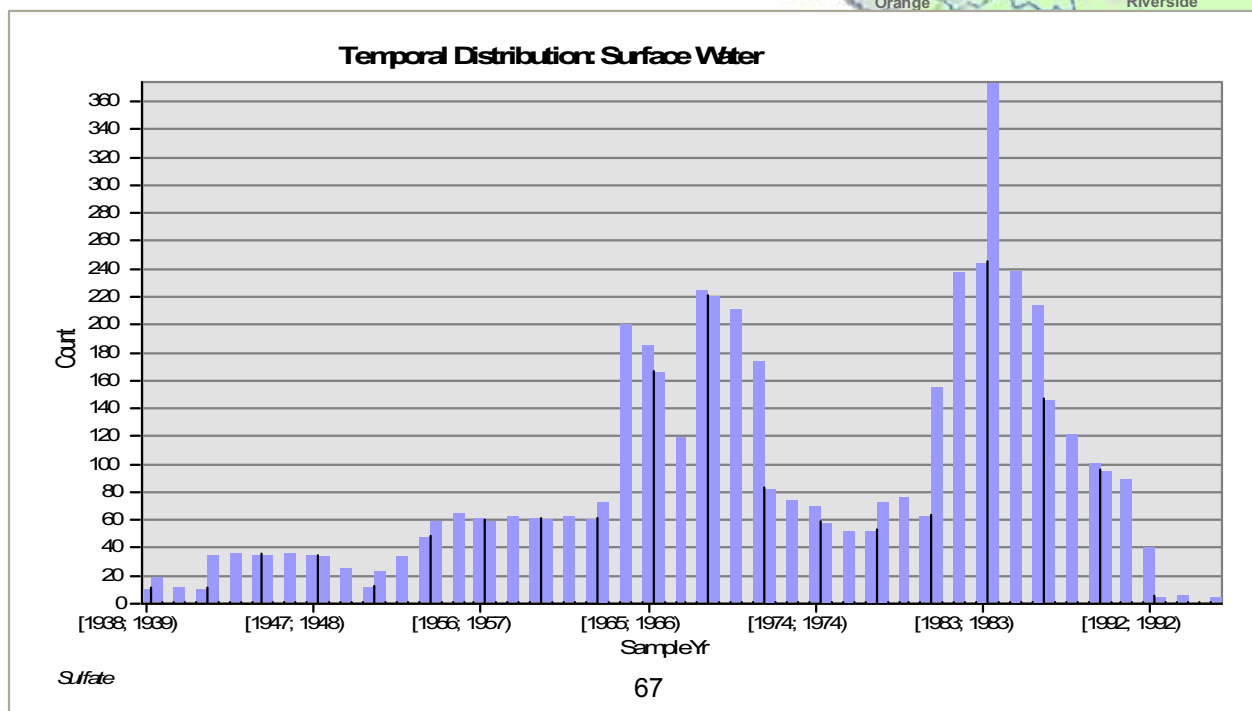
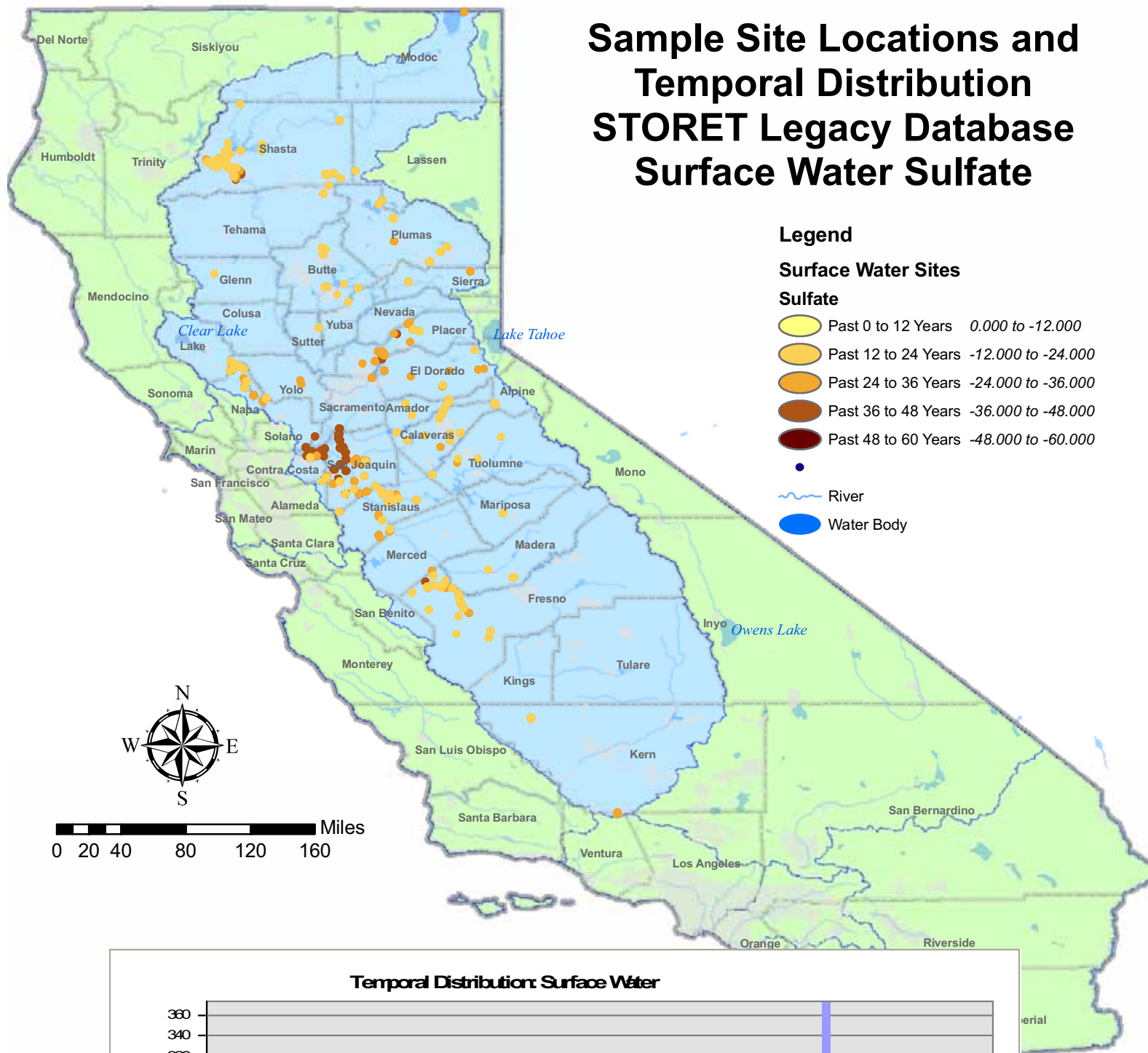
Sample Site Locations and Temporal Distribution STORET Legacy Database Surface Water Alkalinity



Sample Site Locations and Temporal Distribution

STORET Legacy Database

Surface Water Sulfate



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